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Hog
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GLEN C. SANDERSON

ANNUAL PROGRESS REPORT FOR
INVESTIGATIONS PROJECT

As Required By

FEDERAL AID IN FISH AND WILDLIFE RESTORATION ACTS

Job Progress Report

State: Tennessee

Cooperators: University of Tennessee Agricultural Research Laboratory

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: A-1 Job Title: Movements and Home Range

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: Because of the very low trapping success this fiscal year, insufficient data were collected to plot movements, home range, and geographic distribution of hogs in the Tellico River drainage. Movement data were compiled for hogs previously tagged that were killed on the managed hunts. Distance traveled between trap and kill sites varied from 1 to 2½ miles and the time interval ranged from 192 to 870 days. At the present time new telemetry equipment has been ordered for the movement study. However, because of manufacturing delays, the equipment has not been delivered and nothing has been accomplished on the telemetry phase of the study.

II. Contents: A. Movement of tagged hogs.

III. Background: This job is a continuation of a long term trapping and tagging program designed to provide data on movements, home range, and distribution of the hog population. Results to date indicate that hogs do not normally travel from one major drainage system to another. Their movements within a drainage system may be extensive. Hogs transplanted up to seven miles have returned to the original trap site while hogs transplanted 13 or more miles have never returned to the original trap site. This indicates that either hogs exhibit a homing instinct at distances up to somewhere between 7 and 13 miles or else home ranges for the species are a minimum of 7 miles in diameter. The data is useful in evaluating possible areas for stocking of wild hogs and in making recommendations for hog control programs based on transplanting. The distribution patterns in relation to season and food availability and perferred areas for nesting, bedding, and escape have been determined.

IV. Objectives:

A. To determine the home range, daily, seasonal, and annual movements of hogs by age and sex classes and to map the major routes of travel within the Tellico area.

B. To determine the geographical distribution of the European hog population, especially the Tellico River drainage component, by forest and/or ecological cover types including preferred areas of breeding, nesting, and normal daily activities.

V. Procedures:

A. Traps were distributed in various cover types and trap success used to measure hog distribution.

B. Movements of tagged hogs, based on tag recoveries, were plotted on maps and distances measured.

C. Fixed telemetry stations were established at known locations (intersections, campgrounds, etc.) in the Tellico area.

VI. Findings:

Movement of tagged hogs: Table I presents movement data for the only hog that was trapped during this fiscal year. The hog was caught a total of 3 times at different trap sites. All trapping was conducted in Tellico River drainage and the greatest distance between captures was 1.2 airline miles over a 3-day period. The longest interval between captures was 20 days and the distance traveled was 1.1 miles.

Movement data for hogs killed on the annual hunts are considered separately (Table II) because hunting affects movements to the extent that hogs travel greater distances than usually recorded between trap sites. Location of kills are approximate and therefore distances traveled are recorded to the nearest one-half mile. Distance traveled varied from 1 to 2½ miles. The animal killed 2½ miles from the site last trapped was killed 232 days after the last capture. The longest time interval between last capture and kill was 870 days, and the adult male had traveled 1 mile. The shortest interval between last capture and kill was 192 days and the adult male had traveled 1½ miles.

VII. Recommendations: Collection of movement data should continue. The data collected is useful in evaluating possible areas for stocking wild hogs and in making recommendations for hog control programs based on transplanting animals from areas to be controlled. Home range can be used in conjunction with food availability to determine the carrying capacity of an area and evaluate hog populated areas in relation to this carrying capacity. The planned telemetry study should be carried to completion if equipment proves adequate and study proves feasible. The telemetry equip-

TABLE I-- Movements of Wild Hogs Between Trap Sites
Tellico Wildlife Management Area

Ear Notch Number	Sex	Age	Initial Captures Date	Initial Captures Place	Subsequent Captures Date	Subsequent Captures Place	Time Interval (Days)	Air Miles Traveled
34	M	A	7-23-69	Side Laurel Branch	8-12-69	Dam Creek	20	1.1
					8-15-69	McNabb Cr.	3	1.2

TABLE II-- Movements of Hogs Killed on 1969 Managed Hunts
Tellico Wildlife Management Area

Ear Notch Number	Sex	Age	Last Trapped		Killed		Time Interval (Days)	Air Miles Traveled
			Date	Place	Date	Place		
27	M	A	5-31-67	Potato Patch Bottom	10-18-69	McNabb Cr.	870	1
115	F	A	3-13-69	Long Branch	10-31-69	Laurel Br.	232	2½
180	M	A	4-22-69	Lodge	10-31-69	Potato Patch	192	1½
193	M	A	4-8-69	Rape Field	10-31-69	Whigg Ridge	205	1

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ment has been ordered, but manufacturing delays has held up delivery of the equipment. Telemetry would give more accurate data than ever possible with the trap--retrap method.

VIII. Prepared by: Richard H. Conley
Richard H. Conley

Job Progress Report

State: Tennessee

Cooperators: University of Tennessee, Department of Forestry

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: B-1 Job Title: Determining Age by Cementum Layers

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: Upper and lower incisors from 7 known-age European wild hogs were examined for the presence of cementum annuli. The teeth were decalcified, sectioned, and stained according to standard histological techniques. The staining technique provided good differentiation between the dentin and the cementum. In several sections the stains indicated faint layering of the cementum area, but there were no definite patterns corresponding to the age of these hogs.

II. Contents: A. Sectioning teeth.

III. Background: There is a need for techniques to age hogs in order to determine age structure of the population and longevity. This data can then be used to evaluate the condition of the population and factors affecting population size. Aging techniques applicable for hogs 26 months old or less have been developed based on dentition, but a need for aging techniques for older animals is still present.

IV. Objectives: To develop aging techniques for hogs more than 26 months old by examining teeth for annual growth rings.

V. Procedures: The canine and molar teeth from 15 known-age hogs were extracted, decalcified, sectioned, and examined internally for aging by annual cementum layers.

VI. Findings:

Sectioning Teeth: The canines and molars of European wild hogs were found to be the least desirable teeth for studying annual cementum layers. They were large for decalcification purposes and difficult to extract. Therefore, the first upper and lower permanent incisors were used to explore the possibility of aging hogs by cementum layers.

The teeth were extracted from the skull with a pair of plyers. The root was separated from the crown by a hack saw and the root sections were

decalcified. Staining procedures employed were successfully used by Schour and Hoffman (1939).

Eleven of the 14 incisors were successfully sectioned and stained. The other 3 incisors were too brittle for sectioning and had to be deleted from the experiment. The variability in the decalcifying process and the nature of the individual teeth could account for the excessive hardness of these teeth. The sectioning of the teeth was successful when the sections were sliced at 8 to 10 microns. An attempt was made to cut thicker sections, 20 microns, but this caused the tooth to become dislodged from its parafin block. Sauer, et. al. (1966) used frozen sections in much of their microtome work. In both cases sections of thicknesses greater than 10 microns were obtained. The presence of a greater amount of stainable material due to thicker sections may make the annuli more visible. The results indicate that a sectioning device or method that would allow sectioning of hog teeth at a thickness greater than 10 microns would be more desirable.

The staining technique provided good differentiation between dentin and the cementum. In several of the sections the stains indicated a faint layering of the cementum area, but there were no definite patterns corresponding to the age of these hogs.

A major factor that could have affected the results of this experiment was the nature of the test animals themselves. The artificial nutritional balance and environment to which the hogs were subjected prior to tooth extraction may have influenced the apparent layering of the teeth. The deposition of the cementum is believed to be under seasonal influence and thereby cyclic in nature. The circular deposits of cementum are very similar to growth rings found in trees. When food sources are readily available, bone growth is at a maximum and deposition of the cementum layer increased. As colder weather sets in the availability of these substances dwindle and the process of cementum deposition decreases. The bone development of the pen-reared hog is not affected by seasonal food changes as is the wild hog and therefore a sharp contrast of layering is not present. Sauer, et. al. (1966) found in working with captive black bear that both longitudinal and transverse sections from canines showed that layering was generally faint or entirely absent. Low and Cowan (1963) observed a similar condition in red deer; pen-reared and wild deer did not display the same cementum pattern. The inconsistency in layering patterns were attributed to fluctuations in food consumption, especially calcium intake.

VII. Recommendations: Although results from teeth sectioning of pen-reared hogs were not satisfactory, work should continue on this job. Teeth from wild animals should be collected and examined by refining the established histological methods or employing other methods. Other possible aging techniques should be investigated if they appear promising.

VIII. Prepared by: Richard H. Conley
Richard H. Conley

Literature Cited

Low, W. A., and I. McT. Cowan. 1963. Age Determination of Deer by Annular Structure of Dental Cementum. J. Wildl. Mgmt. 27(3):466-471.

Sauer, Peggy R., S. Free, and S. Browne. 1966. Age Determination in Black Bear from Canine Tooth Sections. N. Y. Fish and Game Journal 13(2):125-139.

Schour, I., and M. M. Hoffman. 1939. Studies in Tooth Development. I. The 16 Milron Calcification Rhythm in the Enamel and Dentin from Fish to Man. J. Dent. Res. 18:161-175.

Job Progress Report

State: Tennessee

Cooperators: U. S. Forest Service

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: C-1 Job Title: Ecological Effects of Hog Populations

Period Covered: July 1, 1969 through June 30, 1970

No work accomplished during this segment because of limited time and lack of funds both by Game Management and U. S. Forest Service to construct exclosures and enclosures.

Job Progress Report

State: Tennessee

Cooperators:

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: D-1 Job Title: Mast Yield Estimate

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: A fair mast crop was produced by white oak, chestnut oak, and the red oak group. Hickory was generally poor in production, beech was abundant whenever encountered on the area.

II. Contents:
  - A. Oak Mast Survey
  - B. Relationship of Mast to Population and Reproduction

III. Background: Annual surveys of mast production have been made for several years. These surveys provide data that can be used to estimate the number of hogs that should be harvested, the probable distribution of the hogs during the fall and winter months (important to hunters), the population size the following year and the condition and reproduction. A direct relationship between the mast crop and reproduction was found. In fact, reproduction during the winter was entirely dependent on the mast crop.

IV. Objectives:

A. To determine the areas of mast distribution and relative quantity that will be available.

B. To determine the relationship between the size of the mast crop and the size of the population and reproduction.

V. Procedures:

A. A qualitative census of mast bearing trees was made by driving along the road and using binoculars to observe the amount of mast available.

B. Estimates as to trends in population sizes were made based on the mast crop.

C. For exact details of the procedures consult W-34-R-6.

VI. Findings:

Oak Mast Survey: A mast survey was made on the Tellico area during the period from August 25, 1969 to September 4, 1969.

A fair mast crop was produced this year by white oak, chestnut oak and the red oak group. White oak, chestnut oak, and the red oak group produced few acorns in most areas and a good crop of acorns was recorded in some areas. Hickory mast was poor, producing very little mast in most areas, and abundant mast in one or two places. Beech mast was abundant over most of the area and the nuts were sound. All data was analyzed and filed for reference.

Relationship of Mast to Population and Reproduction: The hog population should increase in 1970 because of a fair mast crop of 1969.

VII. Recommendations: Annual surveys of the mast crop should be continued and compared to populations and reproduction. These surveys are the basis for estimating population trends and determining hog distribution, condition, and reproduction. This data should then be used as a basis for harvest recommendations.

VIII. Prepared by: Richard H. Conley
Richard H. Conley

Job Progress Report

State: Tennessee

Cooperators: U. S. Forest Service

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: E-1 Job Title: Population Trends

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: Overall hunter success in 1969 was 0.5 percent, with 3,177 hunters killing 16 hogs. Dog hunters killed the most hogs (11) and had the highest success (1.0%). The Commission closed the remaining hunts on the Tellico area immediately following the first deer-bear-boar still hunt. Four tagged hogs were killed on the annual hunts. The age composition was entirely adult hogs and the sex ratio was 11 males, 5 females. Trapping success was very low and insufficient data were collected to estimate the size of the population. Only one initial capture was made during the fiscal year. Five hogs trapped in the Great Smoky Mountains National Park were released on the Tellico area. Line transects indicates the population increasing rapidly in comparison to 1969. Survival data indicates higher non-hunting mortality of winter born pigs and higher hunting mortality of summer born pigs.

II. Contents:
- A. 1969 managed hunt kill statistics.
- B. Fall population estimate.
- C. Seasonal weight fluctuations.
- D. Line transect study.
- E. Trapping activity.
- F. Survival of pigs.

III. Background: This job is a continuation of a long term trapping and tagging program that has yielded information on all phases of reproduction, recruitment, growth, mortality, physical conditions, age distribution and the influence of these factors on the population. Population trends and estimates have been determined and the hunting regulations based accordingly.

IV. Objectives: To determine the dynamics of the European hog population, all phases of reproduction, recruitment, growth, senility, mortality, seasonal fluctuations and physical conditions, persistence of each age class and its relative dominance, and the influence that any or all factors exert on the well being and management of the population.

V. Procedures:

A. A long term trapping and tagging program of European wild hogs yields information regarding mortality and persistence of each age class.

B. Physical condition of the hogs throughout the year was determined through recaptures.

C. Application of the Lincoln Index provided an estimate of the hog population.

D. Age distribution of the population was determined by aging animals killed on the managed hunts.

E. Line transects covering the major drainage areas of the Tellico Wildlife Management Area were run and at each 10 minute travel interval spent on the line, the hog sign was recorded as either abundant, common, scarce or absent.

VI. Findings:

Five types of hunts on which hogs were legal game were set for the Tellico Wildlife Management Area in 1969. However, immediately following the first deer-bear-boar still hunt (October 31-November 1, 1969), the remaining hunts on the Tellico area were canceled by the Commission for 1969. Overall hunter success was 0.5 percent, with 3,177 hunters killing 16 hogs.

The remaining two deer-bear-boar still hunts and the deer-bear-boar wilderness hunt were canceled by the Commission for the Tellico area in 1969. Relatively poor hunting success and adverse public opinion precipitated this action by the Commission.

Of the 16 hogs killed, 4 had been tagged. One was initially trapped in 1965, one in 1967, one in 1968, and one in 1969. The hog trapped in 1965 was retrapped twice in 1967 and was not trapped again. The hog trapped in 1967 was retrapped once in 1969. The hog trapped in 1968 was retrapped 3 times the first quarter of 1969. The hog trapped in 1969 was never recaptured.

The age composition and sex ratio of the 1969 kill is presented in Table I. The total sex ratio was 69:31, with 11 males and 5 females.

Fall Population Estimate: Insufficient data were collected this fiscal year to reliably estimate the population.

Seasonal Weight Fluctuations: Weight fluctuations were recorded for 5 multi-captured hogs (Table II). This includes 4 hogs killed on the 1969 hunts. All hogs showed a weight gain except one.

TABLE I-- Age Composition and Sex Ratio
of Harvested European Wild Hogs, 1969

				Percent of	
Age	Male	Female	Total	Total	Known Age
26+ months	5	2	7	43.8	87.5
21-26 months	1	-	1	6.2	12.5
18-22 months	-	-	-	-	-
14-18 months	-	-	-	-	-
12-15 months	-	-	-	-	-
30-51 weeks	-	-	-	-	-
20-33 weeks	-	-	-	-	-
7-19 weeks	-	-	-	-	-
Unaged	5	3	8	50.0	-
Totals	11	5	16	100.0	100.0

TABLE II-- Weight Fluctuations for Multicaptured Hogs
Tellico Wildlife Management Area
July 1, 1969 through June 30, 1970

Ear Notch Number	Tag Numbers	Sex	Dates Trapped	Age	Time Interval in Days	Weight in Pounds	Weight Change (Pounds)
27	1128-1129	M	7/10/65	30-51 wks.		48	
			5/20/67	26+ mos.	648	150	+102
			10/18/69		881	208*	+ 58
34	1349-1350	M	7/23/69	26+ mos.		130	
			8/12/69		20	130	0
115	259-260C	F	4/25/67	7-19 wks.		14	
			10/31/69	26+ mos.	918	179*	+165
180	337-338C	M	12/10/68	30-51 wks.		45	
			4/22/69	12-15 mos.	133	46	+ 1
			10/31/69	21-26 mos.	192	111*	+ 65
193	1345-1346	M	4/8/69	26+ mos.		146	
			10/31/69		206	193*	+ 47

*Whole weight calculated from dressed weight.
C-Circular tags.

Line Transect Study: Ten transect lines were run 18 February - 10 March 1970 to record hog sign in an attempt to detect trends in the population. This method is believed to be valuable in detecting significant changes in the population that would warrant a change in hunting regulations to allow more or less animals to be harvested. However, this method does not detect small population changes. The data obtained this year indicate that the population had increased significantly as compared with the previous year (1969). Therefore, the Tellico Wildlife Management Area is believed to contain a moderate winter population, comparable to the 1963-1965 populations. A comparison of the data of this and past years is found below, in percent of 10-minute travel intervals.

Type of Sign	1963	1964	1965	1966	1967	1968	1969	1970
Abundant	5.1	3.8	5.1	23.4	17.0	26.0	0	5.0
Moderate	23.5	19.7	20.4	28.5	35.7	28.1	6.2	20.7
Scarce or None	71.4	76.5	74.5	48.1	47.3	45.9	93.8	74.3

Trapping Activity: Trapping was conducted throughout the fiscal year, with the exception of October. Trapping success was very poor during the year with only one initial capture. This is one of the poorest trapping years on record.

Because of the poor trapping success during the fiscal year, and adverse public opinion, the Commission entered into an agreement with the Great Smoky Mountains National Park, whereby the Commission would receive trapped hogs from the Park for release on the Tellico area. Table III presents data on the Park hogs released during the fiscal year.

Survival of Pigs: Table IV brings up-to-date survival data for pigs born in summer and winter periods. One hog born in the winter of 1967-68 was killed on the 1969 hunts. No pigs were trapped during the fiscal year; therefore, no data from the 1969 farrowing seasons were added to the table. The table shows hunting mortality is greater for summer born pigs. A greater percentage of summer born pigs are also retrapped in later years than pigs born in the winter. These data suggest high mortality of winter born pigs from causes other than hunting.

VII. Recommendations: All phases of this job should be continued as it provides the basis for management practices based on population size and condition of the animals.

VIII. Prepared by: Richard H. Conley
Richard H. Conley

TABLE III-- Hogs Trapped on Great Smoky Mountains National Park & Released on Tellico Wildlife Management Area July 1, 1969 to June 30, 1970

Ear Notch	Ear Tags	Age	Weight (Pounds)	Initial Capture Date	Initial Capture Place	Release Site Date	Release Site Place
18	359-360C	20-33 wks.	45	4-29-70	Rabbit Cr.	4-29-70	McNabb Cr. Food Plot
47	349-350C	7-19 wks.	23	2-28-70	Cades Cove	2-28-70	Green Cove Food Plot
63	353-354C	7-19 wks.	37	4-17-70	Rabbit Cr.	4-17-70	Potato Patch Bottom
112	351-352C	7-19 wks.	24	2-28-70	Cades Cove	2-28-70	Green Cove Food Plot
140	357-358C	7-19 wks.	43	4-22-70	Rabbit Cr.	4-22-70	Laurel Br. Food Plot

C-Circle Tags

TABLE IV-- Survival of European Wild Hogs
Tellico Wildlife Management Area, 1959-1968*

Season of Birth	Number Trapped	Killed Year of Birth	Trapped 1 Year after Birth	Killed 1 Year after Birth	Trapped 2 Years after Birth	Killed 2 Years after Birth	Trapped 3 Years after Birth	Killed 3 Years after Birth	Trapped 4 or More Years after Birth	Killed 4 or More Years after Birth	TOTALS			
											Recoveries		Killed	
											No.	%	No.	%
December-March '60	26	2	0	0	0	1	0	0	0	0	3	11.5	3	11.5
December-March '64	20	1	3	3	0	0	1	2	0	0	10	50.0	6	30.0
December-March '65	8	0	0	0	1	0	0	1	0	0	2	25.0	1	12.5
December-March '66	41	13	5	2	1	1	0	0	0	0	22	53.6	16	39.0
December-March '67	21	9	3	2	0	0	0	0	0	0	14	66.6	11	52.4
December-March '68	6	4	0	1	0	0	0	0	0	0	5	83.3	5	83.3
TOTALS	122	29	11	8	2	2	1	3	0	0	56	45.9	42	34.4
April-July '59	6	2	0	0	1	0	0	0	0	0	3	50.0	2	33.3
April-July '60	2	1	0	0	0	0	0	1	0	0	2	100.0	2	100.0
April-July '61	3	0	0	0	0	0	0	0	0	0	0	0	0	0

Continued

TABLE IV-- Continued

Season of Birth	Number Trapped	Killed Year of Birth	Trapped 1 Year after Birth	Killed 1 Year after Birth	Trapped 2 Years after Birth	Killed 2 Years after Birth	Trapped 3 Years after Birth	Killed 3 Years after Birth	Trapped 4 or More Years after Birth	Killed 4 or More Years after Birth	TOTALS Recoveries No.	TOTALS Recoveries %	TOTALS Killed No.	TOTALS Killed %
April-July '62	14	0	0	3	2	2	0	0	1	0	8	57.1	5	35.7
April-July '64	22	2	4	4	0	4	1	1	0	0	16	72.2	11	50.0
April-July '65	5	1	3	1	0	0	0	0	0	0	5	100.0	2	40.0
April-July '66	22	2	2	5	0	2	0	0	0	0	11	50.0	7	31.8
April-July '67	7	4	2	0	0	0	0	0	0	0	6	85.7	4	57.1
April-July '68	14	5	0	0	0	0	0	0	0	0	5	35.7	5	35.7
TOTALS	95	17	11	13	3	8	1	2	1	0	56	58.9	40	42.1

*Hogs trapped in more than one year are entered in the table only for the last year trapped or when killed.

Job Progress Report

State: Tennessee

Cooperators:

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: F-1 Job Title: Post-mortem Examination

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: Seven hogs were examined for ectoparasites that were killed on the 1969 annual hunts. No hogs were found harboring any ectoparasites. These hogs were field dressed which precluded examination for endoparasites. Wild hogs have been examined since 1960 for parasites. Trapped hogs were examined for ectoparasites and hogs killed on the annual hunts (October-December) were examined for ecto- and endoparasites. Two ectoparasites, the American dog tick (Dermacentor variabilis) and the hog louce (Haematopinus suis) and 7 endoparasites, gullet worms (Gongylonema sp.), lungworms, (Choerstrongylus pudendotectus and Metastrongylus elongatus), kidney worms (Stephanurus dentatus), stomach worms (Physocephalus sexalatus), ascarids (Ascaris lumbricoides), and whipworms (Trichuris suis) have been found in wild hogs. The effect of these parasites on hogs is unknown, but they are probably directly or indirectly responsible for some mortality.

II. Contents: A. Parasite Study.

III. Background: Trapped and killed hogs have been examined in past years for the presence of diseases and parasites. The susceptibility of hogs to parasites and disease warrants constant observation as part of the hog management program.

IV. Objectives:

A. External and internal parasite collection.

V. Procedures:

A. Trapped hogs were examined for external parasites.

B. Hogs brought intact to the checking stations during the hunting season were examined for internal and external parasites and any gross lesions or abnormality.

VI. Findings:

Seven hogs were examined for ectoparasites that were killed on the annual hunts. No ectoparasites were found. Because these hogs were field dressed, examination for endoparasites was impossible. A continuing study has been carried out since 1960 regarding the species and kinds of parasites involved with parasitizing hogs and the prevalence of parasitism. Trapped hogs were examined for ectoparasites and hogs killed on the annual hunts (October-December) were examined for ecto- and endoparasites.

Two ectoparasites, the American dog tick and the hog louse, have been found on hogs. Ticks were found in and around the ears, on the stomach and flanks. Lice were found on all parts of the animal in great numbers. Ticks infested more hogs than lice, but both parasites exhibited different seasons in which they were prevalent (Table I).

Seven endoparasites have been found in European wild hogs. They are gullet worms, two species of lungworms, kidney worms, stomach worms, ascarids and whipworms. Whipworms, which are usually found in the ceacum and colon were recovered from two kidneys. This is very unusual since no other investigators have reported whipworms being found in the kidneys. Table II presents the prevalence of endoparasitism in hogs killed on the annual hunts.

The effect of ectoparasites on hogs is not clear. The presence of these parasites does not seem to affect the health of the host; however, the possibility that these parasites carry diseases to which hogs are susceptible has not been explored.

Infections of endoparasites may be fatal; however, they probably contribute to mortality by affecting the general health of hogs, thus making them vulnerable to environmental factors.

VII. Recommendations: Results of this 9 year study have been submitted to the Journal of Wildlife Management for publication. However, because of the potential threat parasites and diseases pose to hogs and the lack of complete parasite information, examination of hogs for parasites and diseases should continue. It is a method of detecting possible causes of serious hog mortality at an early stage when preventive measures can be taken.

VIII. Prepared by: Richard H Conley

Richard H. Conley

TABLE I-- Prevalence of Ectoparasites of European Wild Hogs Trapped in the Tellico Wildlife Management Area, Tennessee, By Seasons 1960-1968

Season	Eastern Dog Ticks		Hog Lice	
	No. Examined	Percent Infested	No. Examined	Percent Infested
Winter	8	0.0	8	87.5
Spring	86	26.7	86	1.2
Summer	131	40.5	131	12.2
Fall	41	9.8	41	9.8
Totals	266	30.5	266	10.5
Totals*	205	35.6	205	13.7

*Animals counted only once since some hogs were examined in more than 1 month and in some cases were examined as juveniles and again as adults.

TABLE II-- Prevalence of Endoparasitism of European Wild Hogs Killed on the Annual Hunts, Tellico Wildlife Management Area, Tennessee 1962-1968

Parasites	Prevalence	
	No. Examined	Percent Positive
Gongylonema sp.	35	62.8
Choerstrongylus pudendotectus and Metastrongylus elongatus	32	56.2
Stephanurus dentatus	37	51.3
Physocephalus sexalatus	66	34.8
Ascaris lumbricoides	4	25.0
Trichuris suis*	37	5.4

*Kidneys examined, parasitism by this species is probably more prevalent than indicated because they are normally found in the digestive tract.

Job Progress Report

State: Tennessee

Cooperators: University of Tennessee Agricultural Research Laboratory

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: G-1 Job Title: Area-wide Hog Breeding and Movements

Period Covered: July 1, 1969 through June 30, 1970

I. Summary: Two sows examined that were killed during the 1969 managed hunts were pregnant. These sows had bred in July and would have farrowed in the first half of November. The average number of fetuses was 4.5 and the sex ratio was 22:78 in favor of females. Because of the low trapping success during the fiscal year, other productivity data were not collected. Fifty-four bobcat scats were collected for examination of evidence of predation on pigs. Movement studies utilizing telemetry equipment were not accomplished for reasons explained in Job A-1.

II. Contents:
- A. Reproductive data from 1969 hunts.
- B. Litter size determined by swollen teats.
- C. Farrowing seasons.
- D. Sex ratio of pigs.
- E. Female-juvenile ratio.
- F. Testes development.
- G. Relative importance of different farrowing seasons.
- H. Predation.

III. Background: Data on reproduction of hogs in the wild is needed for comparison with captive hog breeding data in assessing the potential and existing capacity of the species to survive and maintain or increase populations to the point of supplying hunters with a harvestable surplus. Movement data during the breeding season is also needed to formulate management practices that will benefit hogs during this time.

IV. Objectives:

A. To obtain field data concerning reproduction of wild hogs and compare this data with data recorded for captive hog populations.

B. To determine home range and movements of wild hogs during the breeding season.

V. Procedures:

A. Ovaries, reproductive tracts and fetuses were obtained from intact hogs brought to the checking station by hunters.

B. Corpora lutea and fetuses were counted for each reproductive tract and the embryonic loss computed.

C. Approximate breeding and farrowing dates were computed by comparing fetuses to known age fetuses.

D. Trapped wild hogs were examined for pregnancy and evidence of lactation. Swollen teats were counted to determine litter size. Trapped pigs were aged, and by backdating, the farrowing date determined.

E. One testes was removed from a sample of wild trapped pigs between 0 and 8 months of age to determine testes development.

F. Bobcat scats were collected on the area for study of predation on pigs.

VI. Findings:

Reproduction Data from 1969 Hunts: Two reproductive tracts were collected from sows killed in 1969. Both sows were pregnant. The average number of fetuses was 4.5 and ranged from 4 to 5. The sex ratio of these fetuses was 22:78, with two males and seven females. Aging and backdating gave breeding dates of 10 and 24 July 1969. The pigs would have been born 1 and 15 November 1969.

Two hunters reported killing non-pregnant sows, however, these hogs were field dressed and not examined.

Table I presents the reproductive data from the 1969 hunts.

Litter Size Determined by Swollen Teats: No sows were trapped this year from which the average litter size of hogs could be determined.

Farrowing Seasons: No pigs were trapped this year from which farrowing seasons could be determined.

Sex Ratio of Pigs: No pigs were trapped this year from which a sex ratio could be determined.

Female-juvenile Ratio: No sows or juveniles were captured this year from which a female-juvenile ratio could be determined.

Testes Development: No testes were removed from trapped pigs because of poor trapping success.

Relative Importance of Different Farrowing Seasons: In bringing accumulated data up to date, Table II presents productivity data for trapped hogs and Table III presents data on the season of birth for hogs killed or trapped that were under 26 months of age. These tables again emphasize two main

TABLE I-- Breeding Data from 1969 Kill
Tellico Wildlife Management Area

Kill Number	Age (Months)	Corpora Lutea	Fetuses M	Fetuses F	Fetuses Total	Embryonic Loss (%)	Approximate Age of Fetuses (Days)	Approx. Breeding Date
1	26+	5	0	5	5	0.0	100	7-10-69
7	26+	0	2	2	4	-	100	7-24-69
10	Not Aged		Not Pregnant				Hunter Report	
11	Not Aged		Not Pregnant				Hunter Report	

TABLE II-- Productivity of European Hogs Trapped
From 1 August 1969 through 30 June 1970

Period	Litter Size		Suckling Rate	Pregnancy 1***	Rate 2****	Vul. Rate**	Female-Juv. Ratio
	Average	Range					
Aug.-Nov. 1969	-	-	0.0	0.0	0.0	0.0	0.0
Dec.-March 1970	-	-	0.0	0.0	0.0	0.0	0.0
April-July 1970	-	-	0.0	0.0	0.0	0.0	0.0
TOTALS							
Dec.-March 1961-1970	4.60(5)	4-5	17.7(45)	27.0(37)	22.2(45)	39.9(45)	1:0.68(76)
April-July 1961-1970	4.33(18)	1-8	34.4(61)	22.2(40)	11.5(61)	45.9(61)	1:1.83(153)
Aug.-Nov. 1961-1970	3.71(7)	3-4	22.9(48)	8.1(37)	6.3(48)	29.2(48)	1:2.12(150)

*Figures in parenthesis indicate number of litters or number of sows in sample.
**Percent of sows pregnant or suckling.
***Percent of sows not suckling that are pregnant.
****Percent of total sows pregnant.

TABLE III-- Season of Birth for Hogs Killed or Trapped Under 26 Months of Age, Tellico Wildlife Management Area

	Hogs Killed			Hogs	Hogs Killed
Period	Untagged	Tagged	Total	Trapped	or Trapped
April-July, 1962	10	5	15	10	25
Aug.-Nov., 1962	3	1	4	3	7
Dec.-Mar., 1963	14	--	14	--	14
Apr.-July, 1963	16	6	22	--	22
Aug.-Nov., 1963	12	1	13	1	14
Dec.-Mar., 1964	21	9	30	13	43
Apr.-July, 1964	12	7	19	16	35
Aug.-Nov., 1964	16	--	16	4	20
Dec.-Mar., 1965	6	2	8	4	12
Apr.-July, 1965	16	5	21	5	26
Aug.-Nov., 1965	14	7	21	16	37
Dec.-Mar., 1966	61	12	73	17	90
April-July, 1966	48	10	58	15	73
Aug.-Nov., 1966	21	1	22	3	25
Dec.-Mar., 1967	15	10	25	23	48
Apr.-July, 1967	27	7	34	12	46
Aug.-Nov., 1967	8	--	8	4	12
Dec.-Mar., 1968	35	3	38	3	41
April-July, 1968	38	4	42	10	52
Aug.-Nov., 1968	8	--	8	8	8
Dec.-Mar., 1969	--	--	--	--	--
Apr.-July, 1969	--	--	--	--	--
Aug.-Nov., 1969	--	--	--	--	--
Dec.-Mar., 1970	--	--	--	--	--
Apr.-July, 1970	--	--	--	--	--
TOTALS					
Dec.-Mar., 1960-70	152	36	188	60	248
Apr.-July, 1960-70	167	44	211	68	279
Aug.-Nov., 1959-70	82	10	92	39	131

farrowing seasons, one in the winter and one in late spring and early summer.

Predation: No predator trapping was conducted by project personnel during the fiscal year. Fifty-four bobcat scats were, however, collected from 9 trails throughout the Tellico area in the spring. The scats were preserved for detailed examination to determine predation on pigs.

VII. Recommendations: Collection of reproduction data should be continued and results related to food availability. Because reproduction is so closely related to mast production, hunting seasons should be set annually, accordingly. Efforts should be made to determine the reasons for the relationship between mast production and reproduction. Perhaps a substitute for mast that would stimulate reproduction and minimize mortality could be found.

VIII. Prepared by: Richard H. Conley
Richard H. Conley

Job Progress Report

State: Tennessee

Cooperators:

Project No.: W-34-10 Project Title: European Hog Research Project

Job No.: H-1 Job Title: Dogging European Wild Hogs

Period Covered: July 1, 1969 through June 30, 1970

No work accomplished during this segment because of limited time and inadequate telemetry equipment.

Approved by: Vernon G. Henry
Vernon G. Henry

Title : Supervisor of Research

Approved by: Larry R. McGinn
Larry R. McGinn

Title : P-R Coordinator

Approved by: TENNESSEE GAME & FISH COMMISSION

By : Harold Edwards

Title : Acting Director

Date : April 27, 1971

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